Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

F.—OSAGE COUNTY COALS.

(Osage City, Scranton, Carbondale, Burlingame, &c.)

| *Number of sample.* | *Pounds water at 212° evaporated, per pound coal.* | | *Duration of burning, seconds.* | *Remarks.* |
|---|---|---|---|---|
| | CORRECTION ON APPARATUS. | | | |
| | *10 per cent.* | *30 per cent.* | | |
| 1 | 11.88 | 14.02 | 110 | Brown residue. |
| 2 | 10.96 | 12.93 | 90 | " |
| 3 | 12.98 | 15.32 | 120 | " |
| 4 | 11.66 | 13.76 | 120 | " |
| 5 | 12.43 | 14.67 | 120 | " |
| 6 | 11.99 | 14.15 | 165 | " |
| 7 | 11.66 | 13.76 | 120 | " |
| 8 | 11.88 | 14.02 | 120 | " |
| 9 | 11.55 | 13.63 | 70 | " |
| 10 | 11.44 | 13.50 | 80 | " |
| 11 | 11.66 | 13.76 | 105 | " |
| Average | 11.76 | 13.96 | ..... | |
| All samples mixed | 12.10 | 14.28 | 135 | |

G.—FRANKLIN COUNTY COAL.

| | | | | |
|---|---|---|---|---|
| 1 | 12.32 | 14.54 | 125 | ........................ |

H.—CLOUD COUNTY COAL.

| | | | | |
|---|---|---|---|---|
| 1 | 9.90 | 11.68 | 135 | ........................ |

## SUMMARY.

From these results, the Kansas coals thus far examined are to be arranged in the following order as regards their evaporative powers.

[NOTE.—About *one-half* the evaporative powers here given under the 10 per cent. correction, will be obtained in practice.]

| *Order.* | *Name of coal.* | *Table.* | *Pounds water evaporated per pound coal.* | | *Duration of burning—seconds.* | *Calories gram-degrees Centigrade.* | |
|---|---|---|---|---|---|---|---|
| | | | | | | CORRECTION. | |
| | | | *10 per cent.* | *30 per cent.* | | *10 pr ct.* | *30 pr ct.* |
| 1 | Cherokee | A. | 13.42 | 15.84 | 65 | 7206 | 8506 |
| 1 | Fort Scott | C. | 13.20 | 15.58 | 60 | 7088 | 8364 |
| 3 | Linn County | E. | 12.76 | 15.06 | 65 | 6852 | 8105 |
| 4 | Cherokee, upper vein,<br>Leavenworth, | B.<br>D. | 12.54 | 14.80 | 50<br>75 | 6734 | 7946 |
| 5 | Franklin County | G. | 12.32 | 14.54 | 125 | 6615 | 7806 |
| 6 | Osage County | F. | 12.10 | 14.28 | 115 | 6498 | 7668 |
| 7 | Cloud County | H. | 9.90 | 11.68 | 135 | 5316 | 6273 |
| | For comparison: Best Indiana Block (Clay county) | .......... | 14.43 | 17.03 | ............... | 7749 | 9144 |

The coals depreciate in their steam-producing powers from the southeastern part of the State toward the north and west. Prof. Bailey finds they depreciate in the amounts of fixed carbon in a similar order.

PHYSICAL LABORATORY, STATE UNIVERSITY, Oct. 1888.

---

## THE COMPOSITION OF KANSAS COALS.

BY E. H. S. BAILEY, PH.D.

The eastern part of the State of Kansas is fortunately underlaid with a fair quality of coal. With the increased population, the introduction of important manufacturing industries, and the extension of the several lines of railway, there is naturally a greater demand for cheap fuel, and a greater interest in its economic supply.

The coal beds may be divided into several groups, the lowest being in the extreme southeastern part of the State. Above the thin local deposits in the vicinity of Baxter Springs, appears the Cherokee vein, the most important in the State. This crops out along a line about 30 miles in length, extending from Columbus to Mulberry on the Missouri line. There are important workings at Columbus, Scammonville, Weir City, Pittsburg, Frontenac, and Litchfield. The dip of the vein, which is about thirty-six inches in thickness, is towards the northwest. The coal is mined both by stripping and by the use of shafts to a depth of one hundred and twenty feet.

Above the Cherokee coal there is an outcrop of a thinner vein, which we have called the "Cherokee upper vein." This is worked to a limited extent in the vicinity of Pittsburg, though it is possible that the coal mined at Arcadia may belong to the the same vein. The seam is less than two feet in thickness.

As we ascend in the series, the Fort Scott coals next claim attention. These occur near the surface, and are mined in several places in the vicinity of Fort Scott. On the bluffs of the Marmaton river, east of the city, the coal is mined by stripping or in shallow slopes. There are banks in other localities, also. The vein is about twenty inches in thickness, and is known as "red coal," from the fact that it so readily oxidizes and becomes covered with iron-rust. The output of this excellent coal is small, and is mostly consumed in the vicinity.

The Leavenworth coal, from its similarity to the coals of Bourbon county, may be noticed in the connection. There are three shafts in actual operation, and two others are being sunk. The coal is mined at a depth of seven hundred and thirty feet, the vein being about twenty-two inches in thickness.

The Linn county coal is mined most extensively in the vicinity of Pleasanton and LaCygne. The coal is found at a depth of from sixty to one hundred and ten feet, and the vein is about twenty-two inches thick.

The Osage county coal-measures, from their accessibility and proximity to market, are very extensively worked. The outcrop of the field extends from near the Neosho rapids in a northeasterly direction into Shawnee county. Although stripped in a few places, it is usually mined by means of shafts from thirty to one hundred feet in depth. The vein, which has a slight dip to the northwest, is about seventeen inches in thickness. Some of the most important mining plants are located at Carbondale, Scranton, Burlingame, Peterton, Osage City, and Barclay.

Only one specimen of coal has been examined from Franklin county, and one from Minersville, Cloud county.

In obtaining the samples of the coals analyzed, all the mines, with the exception of the Ransomville and Cloud county, have been visited personally. Samples from all the different sizes of coals mined have been taken, in order to get the average of the coal as sent to the consumer.

The ordinary method in use among chemists for the analysis of coals has been followed. The actual amounts of carbon, hydrogen, etc., present in the coals, are not determined, but by the process we do determine the actual amounts of substances driven off under similar conditions, so the method is a valuable one for the comparison of coals.

In the analyses which follow, it will be noticed that the average for each region is given in the line below each variety. In the summary of averages, the analyses of some other coals are given for comparison.

## COMPOSITION OF KANSAS COALS.

### A.—Cherokee.

| *Number.* | *Water.* | *Volatile.* | *Fixed carbon.* | *Ash.* | *Color of ash.* |
|---|---|---|---|---|---|
| 1 | 1.54 | 38.06 | 53.44 | 6.96 | Gray. |
| 2 | 1.26 | 35.60 | 52.20 | 10.94 | Drab. |
| 3 | 1.37 | 37.19 | 50.23 | 11.21 | Reddish gray. |
| 4 | 2.59 | 39.12 | 51.54 | 6.75 | Brownish. |
| 5 | 1.35 | 36.11 | 50.94 | 11.60 | Gray. |
| 6 | 2.49 | 34.59 | 54.11 | 8.81 | Light gray. |
| 7 | 2.76 | 36.21 | 54.91 | 6.12 | Light gray. |
| 8 | 2.75 | 36.76 | 53.08 | 7.41 | Gray. |
| 9 | 1.33 | 37.33 | 51.59 | 9.75 | Brownish gray. |
| Average | 1.94 | 36.77 | 52.45 | 8.84 | |

### B.—Cherokee, (upper vein.)

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2.25 | 34.17 | 49.51 | 14.07 | Grayish brown. |
| 2 | 2.07 | 34.37 | 50.21 | 13.35 | Grayish brown. |
| 3 | 1.91 | 37.44 | 46.19 | 14.46 | Gray. |
| Average | 2.08 | 35.32 | 48.64 | 13.96 | |

### C.—Fort Scott.

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2.35 | 42.79 | 45.00 | 9.86 | Reddish. |
| 2 | 2.21 | 43.89 | 45.15 | 8.75 | Reddish brown. |
| 3 | 4.27 | 38.61 | 52.49 | 4.63 | Reddish brown. |
| Average | 2.94 | 41.76 | 47.55 | 7.75 | |

### D.—Leavenworth County.

| | | | | | |
|---|---|---|---|---|---|
| 1 | 3.22 | 41.55 | 49.32 | 5.91 | Dark red. |
| 2 | 2.25 | 36.49 | 47.27 | 13.99 | Light red. |
| 3 | 2.61 | 39.58 | 45.65 | 12.16 | Brick color. |
| Average | 2.69 | 39.21 | 47.41 | 10.69 | |

### E.—Linn County.

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1.61 | 38.25 | 48.76 | 11.38 | Dark brown. |
| 2 | 2.36 | 49.14 | 48.88 | 8.62 | Reddish brown. |
| 3 | 2.39 | 42.19 | 42.05 | 13.37 | Yellowish brown. |
| 4 | 1.92 | 37.11 | 47.87 | 13.10 | Red. |
| Average | 2.07 | 39.42 | 46.89 | 11.62 | |

### F.—Osage County.

| | | | | | |
|---|---|---|---|---|---|
| 1 | 7.19 | 40.03 | 41.13 | 11.65 | Brown. |
| 2 | 7.71 | 41.56 | 39.92 | 10.81 | Light brown. |
| 3 | 9.29 | 42.05 | 40.89 | 7.77 | Red. |
| 4 | 4.70 | 44.86 | 42.11 | 8.33 | Dark brown. |
| 5 | 6.75 | 42.79 | 40.97 | 9.49 | Dark brown. |
| 6 | 7.27 | 41.45 | 41.35 | 9.93 | Dark red. |
| 7 | 5.56 | 42.79 | 39.32 | 12.33 | Dark red. |
| 8 | 5.83 | 43.26 | 41.75 | 9.16 | Reddish brown. |
| 9 | 7.36 | 38.33 | 38.54 | 15.77 | Dark brown. |
| 10 | 4.91 | 39.58 | 43.17 | 12.34 | Yellowish brown. |
| 11 | 7.77 | 40.85 | 40.29 | 11.09 | Light brown. |
| Average | 6.76 | 41.59 | 40.86 | 10.79 | |

### G.—Franklin County.

| | | | | | |
|---|---|---|---|---|---|
| 1 | 7.55 | 44.40 | 37.68 | 10.37 | Gray. |

### H.—Cloud County.

| | | | | | |
|---|---|---|---|---|---|
| 1 | 13.70 | 46.14 | 28.52 | 11.64 | Dark gray. |

The *averages* as given above are collected in the following table:

| *Name.* | *Water.* | *Volatile.* | *Fixed carbon.* | *Ash.* |
|---|---|---|---|---|
| Cherokee | 1.94 | 36.77 | 52.45 | 8.84 |
| Cherokee, (upper vein) | 2.08 | 35.32 | 48.64 | 13.96 |
| Fort Scott | 2.94 | 41.76 | 47.55 | 7.75 |
| Leavenworth county | 2.69 | 39.21 | 47.41 | 10.69 |
| Linn county | 2.07 | 39.42 | 46.89 | 11.62 |
| Osage county | 6.76 | 41.59 | 40.86 | 10.79 |
| Franklin county | 7.55 | 44.40 | 37.68 | 10.37 |
| Cloud county | 13.70 | 46.14 | 28.52 | 11.64 |
| Pittsburgh, Pa | 1.31 | 36.61 | 54.17 | 7.91 |
| Nebraska | 4.93 | 38.17 | 49.44 | 7.46 |
| Warren county, Missouri | 6.75 | 36.40 | 45.75 | 11.10 |

If the water and ash are eliminated in the calculation from the above results, as is suggested in a recent report of the Pennsylvania Geological Survey, the coals of Kansas will be divided into five groups. In the first group are included the Cherokee coals; in the second, Fort Scott, Leavenworth and Linn counties; in the third, Osage county; in the fourth, Franklin county; and in the fifth, Cloud county.

The coals found in the extreme southeast are richer in fixed carbon or coke, and this diminishes as we go toward the northwest. On the other hand, the volatile matter is more abundant compared with the fixed carbon in the upper or northern coals. There is uniformly more water in the Osage county coals and in those above it, than in the lower coals. In regard to ash, Cherokee and Fort Scott contain the least; the others contain from 10 to 12 per cent.

As the sulphur is so unevenly distributed, an analysis for this was not made. Previous examinations, however, show that there exists from 2 to 5 per cent. of sulphur. A part of this may be present in sulphate of lime, but much of it is united with iron in iron pyrites.

This examination was taken up for the purpose of preparing a report for the State Board of Agriculture. The specimens reported above are identical with those discussed by Prof. L. I. Blake, in the article on "The Evaporative Power of Kansas Coals," which appears at page 42 of this volume.

In conclusion, I wish to acknowledge the very valuable assistance afforded me by Mr. L. T. Smith, in the performance of a large part of the analytical work required in this investigation.

## ON THE ECONOMIC VALUE OF CORN-COBS.

BY E. H. S. BAILEY, PH. D.

[*Abstract.*]

The importance of utilizing all possible varieties of fuel is most apparent in those parts of the country where fuel is scarce, so that the project to make use of any waste material in a prairie region is in the direction of greater economy.

Cobs bring a fair price as fuel in many towns in Kansas, but the chief difficulty with their use is that they are so rapidly consumed. Some time ago, in connection with E. L. Nichols, I made a few experiments on the possibility of obtaining gas from the cobs, and by this means getting the fuel in a concentrated form. By heating the ground cobs in a small iron retort, it was found that gas was readily made. This gas was not rich in those hydrocarbons which produce light, but contained more carbon monoxide (CO) and hydrogen. By passing this gas through gasoline or some